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The AMS-02 Detector: Design and Operation on Board the International Space Station

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The Alpha Magnetic Spectrometer (AMS-02) is a high-energy physics experiment designed to operate in space on board the International Space Station (ISS), where it has been installed on May 16th 2011. Thanks to the very large acceptance ($\sim 0.5 \text{ m}^2 \text{ sr}$) and an exposure time of several years, matching the ISS lifetime, AMS-02 will measure a wealth of data to study with unprecedented accuracy the composition and the energy spectrum of charged CRs and gammas up to the TeV energy scale, allowing for the search of primordial antimatter and dark matter annihilation products.

Nine layer of silicon microstrip detectors constitute the core of the spectrometer, allowing the simultaneous measurement of the charge magnitude and sign of impinging particles and reconstructing their rigidity up to the TV. A 3D imaging calorimeter, with a depth of 16 radiation lengths and a TRD detector allow an accurate measurement of the electron and positron components of CRs, allowing an effective rejection of the proton background. Velocity measurement and redundant charge measurement are performed by the scintillator planes of the Time of Flight system and a Ring Imaging Cherenkov detector. During the first nine months of data taking, $\sim 1.5 \cdot 10^{10}$ triggers have been recorder: we will report on the flight operations and performance of AMS-02 and its perspective for physics measurements. The design, integration and ground calibration of the detector will also be reviewed.

for the collaboration

AMS-02 Collaboration

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